

CLAIMS

1. A fuel cell power generation system comprising:
a reformer of producing a hydrogen-rich fuel gas by reacting with a raw material and water vapor;

a fuel cell of generating power by using the fuel gas and an oxidizing gas;

a raw material flow rate detecting instrument which detects the flow rate of the raw material supplied into said reformer;

a water vapor flow rate detecting instrument which detects the flow rate of the water vapor supplied into the reformer;

a fuel gas flow rate detecting instrument which detects the flow rate of the fuel gas produced in said reformer;
and

a deterioration degree detecting instrument which calculates the degree of deterioration of said reformer by comparing the calculated flow rate of a fuel gas calculated from the flow rate of the raw material and the flow rate of the water vapor with the detected flow rate of the fuel gas detected.

2. The fuel cell power generation system according to Claim 1, wherein said deterioration degree detecting instrument calculates the flow rate of the fuel gas produced

when said reformer is not deteriorated as the calculated flow rate.

3. The fuel cell power generation system according to Claim 1, further comprising a reformer heating instrument which raises the reaction temperature of said reformer according to the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of the fuel gas reaches not smaller than a value at which power generation of said fuel cell is possible.

4. The fuel cell power generation system according to Claim 1, further comprising a water vapor flow rate controlling instrument which controls the flow rate of the water vapor according to the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of the water vapor increases to cause the flow rate of the fuel gas reach not smaller than a value at which power generation of said fuel cell is possible.

5. The fuel cell power generation system according to Claim 4, further comprising a raw material flow rate controlling instrument which controls the flow rate of the raw material to increase according to the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of the fuel gas reach not smaller than a value at which power generation of said fuel cell is possible.

6. The fuel cell power generation system according to Claim 1, further comprising a generated power output control instrument which controls the generated power output according to the degree of deterioration detected by said deterioration degree detecting instrument so that the generated power output decreases to not greater than a value at which power generation of said fuel cell is possible.

7. The fuel cell power generation system according to Claim 1, comprising a life diagnosing instrument which determines the falling rate of the degree of deterioration based on the degree of deterioration of said reformer and the power generation time to calculate the period to reach the lower limit of the degree of deterioration of said reformer at which power generation of said fuel cell is made possible.

8. The fuel cell power generation system according to Claim 1, wherein said deterioration degree detecting instrument uses conversion ratio of methane as the degree of deterioration of said reformer.

9. A method of detecting the degree of deterioration of a reformer of a fuel cell system comprising:

a raw material flow rate detecting step of detecting the flow rate of a raw material supplied into said reformer producing a hydrogen-rich fuel gas by reacting with a raw

material and water vapor;

a water vapor flow rate detecting step of detecting the flow rate of the water vapor supplied into said reformer;

a fuel gas flow rate detecting step of detecting the flow rate of the fuel gas produced in said reformer; and

a deterioration degree detecting step of calculating the degree of deterioration of said reformer by comparing the calculated flow rate of the fuel gas calculated from the flow rate of the raw material and the flow rate of the water vapor with the detected flow rate of the fuel gas detected.

10. A fuel cell power generation method which executes power generation of a fuel cell using a fuel gas by making the use of the method of detecting the degree of deterioration of the reformer of the fuel cell power generation system according to Claim 9, comprising:

a reformer heating step of raising the reaction temperature of said reformer according to the degree of deterioration detected by said deterioration degree detecting step so that the flow rate of the fuel gas reaches not smaller than a value at which power generation of the fuel cell is made possible.

11. A fuel cell power generation method which executes power generation of a fuel cell using a fuel gas by making the use of the method of detecting the degree of deterioration

of the reformer of the fuel cell power generation system according to Claim 9, comprising:

a water vapor flow rate controlling step of controlling the flow rate of the water vapor according to the degree of deterioration detected by said deterioration degree detecting step so that the flow rate of the water vapor increases to cause the flow rate of the fuel gas reach not smaller than a value at which power generation of said fuel cell is made possible.

12. A fuel cell power generation method which executes power generation of a fuel cell using fuel gas by making the use of the method of detecting the degree of deterioration of the reformer of the fuel cell power generation system according to Claim 9, comprising:

a raw material flow rate controlling step of controlling the flow rate of the raw material to increase according to the degree of deterioration detected by said deterioration degree detecting step so that the flow rate of the fuel gas reach not smaller than a value at which power generation of said fuel cell is made possible.

13. A fuel cell power generation method of executing power generation of a fuel cell using the fuel gas by making the use of the method of detecting the degree of deterioration of the reformer of the fuel cell power generation system according to Claim 9, comprising:

a generated electric power output controlling step of controlling the generated power output according to the degree of deterioration detected by said deterioration degree detecting step so that the generated power output decreases to not greater than a value that allows power generation of said fuel cell.

14. A program of allowing a computer to perform as said deterioration degree detecting unit of the fuel cell power generation system according to Claim 1 of calculating the degree of deterioration of said reformer by comparing the calculated flow rate of fuel gas calculated from the flow rate of the raw material and the flow rate of the water vapor with the detected flow rate of fuel gas detected.

15. A program of allowing a computer to perform as said reformer heating instrument of the fuel cell power generation system according to Claim 3 of raising the reaction temperature of said reformer according to the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of fuel gas reaches not smaller than a value at which the power generation of said fuel cell is possible.

16. A program of allowing a computer to perform as a water vapor flow rate controlling instrument of the fuel cell power generation system according to Claim 4 of controlling the flow rate of the water vapor according to

the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of the water vapor increases to not smaller than a value at which power generation of said fuel cell is possible.

17. A program of allowing a computer to perform as a raw material flow rate increasing instrument of a fuel cell power generation system according to Claim 5 of controlling the flow rate of the raw material to increase according to the degree of deterioration detected by said deterioration degree detecting instrument so that the flow rate of the fuel gas reaches not smaller than a value at which power generation of said fuel cell is possible.

18. A program of allowing a computer to perform as a generated electric power output controlling instrument of the fuel cell power generation system according to Claim 6 of controlling the generated power output according to the degree of deterioration detected by said deterioration degree detecting instrument so that the generated electric power output decreases to not greater than a value at which power generation of said fuel cell is possible.

19. A recording medium having a program according to any one of Claims 14 to 18 carried thereon, which can be processed by a computer.